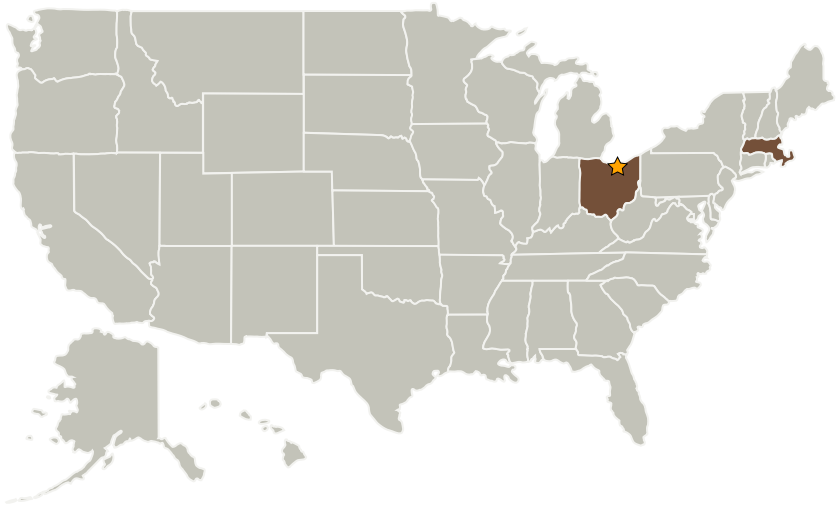
Low-power, Confocal Imaging of Protein Localization in Living Cells (7214-150), Phase I

Completed Technology Project (2004 - 2004)

Project Introduction

The proposed technology genetically labels intracellular structures and visualizes protein interactions in living cells using a compact, confocal microscope with solid-state laser illumination. The proposed innovation will allow advanced study of cellular biology in microgravity environments. The recently introduced reef coral proteins fluoresce over a broader range of wavelengths than GFP and its derivatives. This allows simultaneous fluorescence labeling of three, and possibly four, cellular constituents simultaneously. The proposed confocal microscope will be based entirely on compact, low-power solid-state laser technology and will allow high-resolution imaging of structures within living cells in three colors simultaneously at standard video frame rates. As part of this innovation we will develop a 594 nm solid state laser for improved resolution of HcRed, the most red-shifted of the reef coral proteins. In Phase I we will set up a biological model that incorporates three different protein fusions. Phase I microscopy studies will determine the specifications for spectral and spatial resolution for the Phase II device. That Phase II device will comprise a compact system that uses low-power solid-state laser illumination. The device will have broad applicability for space cell biology research and also for terrestrial-based cell biology research.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Anthony J Ferrante

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers